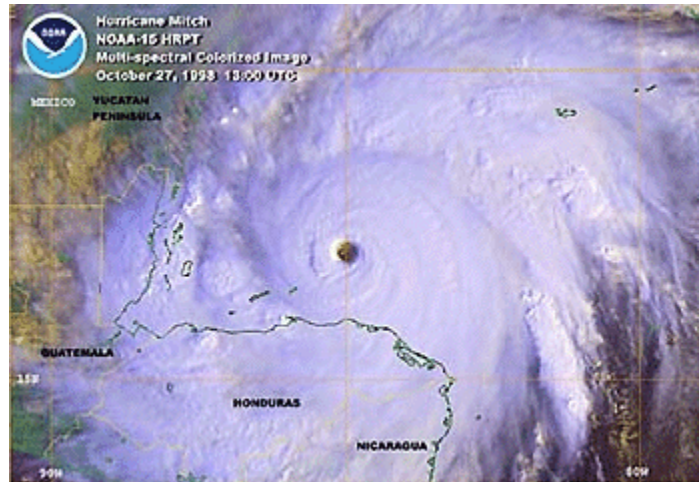


# Hurricane Mitch

## The Deadliest Atlantic Hurricane Since 1780

National Oceanic and Atmospheric Administration

National Climatic Data Center



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### *Storm Review*

In an awesome display of power and destruction, Hurricane Mitch will be remembered as the most deadly hurricane to strike the Western Hemisphere in the last two centuries! Not since the Great Hurricane of 1780, which killed approximately 22,000 people in the eastern Caribbean, was there a more deadly hurricane. Mitch struck Central America with such viciousness that it was nearly a week before the magnitude of the disaster began to reach the outside world. The death toll currently is reported as 11,000 with thousands of others missing. Though the final death toll will never be known, it is quite likely that Mitch directly killed more people than any Atlantic hurricane in over 200 years. More than three million people were either homeless or severely affected. In this extremely poor third world region of the globe, estimates of the total damage from the storm are at \$5 billion and rising. The President of Honduras, Carlos Flores Facusse, claimed the storm destroyed 50 years of progress. Table 1 lists the top seven most deadly hurricanes ever witnessed in the Western Hemisphere. Mitch is ranked number 2, a rank which will likely stand for a long, long time.

Table 1 - Most Deadly Western Hemisphere Hurricanes on Record

Hurricane	Date	Areas Struck	Deaths
"The Great Hurricane"	October 10-16, 1780	Martinique St. Eustatius Barbados Ships	22,000
Hurricane Mitch	Oct 26 - Nov 4, 1998	Central America: Honduras Nicaragua	11,000+
Galveston, Texas	September 8, 1900	Galveston Island	8,000
Hurricane Fifi	September 14 -19, 1974	Honduras	8,000
Dominican Republic	September 1-6, 1930	Dominican Republic	8,000
Hurricane Flora	Sep 30, 1963 - Oct 8, 1963	Haiti Cuba	7,200
Martinique	September 6, 1776	Point Petre Bay	6,000

Reference:

1995: Rappaport, Edward N. and Fernandez-Partagas, Jose; "The Deadliest Atlantic Tropical Cyclones, 1492-1994," NOAA Technical Memorandum NWS NHC-47, National Hurricane Center, 41 pp.

### Category 5 Monster

1. Within four days of its birth as a tropical depression on October 22, Mitch had grown into a Category 5 storm on the [Saffir-Simpson Hurricane Scale](#). By 2100 UTC on October 26, the monster storm had deepened to a pressure of 905 millibars with sustained winds of 155 knots (180 mph) and gusts well over 200 mph! Mitch thus became tied for the fourth strongest Atlantic hurricane on record based upon barometric pressure values. Though the pressure began rising six hours later, Mitch remained at Category 5 status for a continuous period of 33 hours - the longest continuous period for a Category 5 storm since the 36 consecutive hours by Hurricane David in 1979. In addition, Mitch maintained sustained winds of 155 knots for 15 hours - the third longest period of such winds on record after the continuous 18 hours of 155 knot winds or higher by Hurricane Camille in 1969 and Hurricane Dog in 1950. Though exact comparisons are suspect due to differing frequencies in observation times (3-hourly versus 6-hourly observations) and a bias in earlier years toward higher estimated wind speeds, it is quite apparent that Mitch

was one of the stronger storms ever recorded in the Atlantic. Table 2 provides historical information on the strongest hurricanes ever recorded in the Atlantic Basin, which includes the Gulf of Mexico and the Caribbean Sea.

Table 2 - Strongest Atlantic Hurricanes on Record

<b>Hurricane</b>	<b>Date</b>	<b>Pressure</b>	<b>Peak Winds</b>	<b>Total no. of hours at Cat 5</b>	<b>Total no. of hours winds 155+ knots</b>
Gilbert	Sep 13, 1988	888 mb (26.22 in)	160 knots	18 hours	6 hours
Florida Keys	Sep 3, 1935	892 mb (26.34 in)	140 knots	3 hours	0 hours
Allen	Aug 7, 1980	899 mb (26.55 in)	165 knots	24 / 24 / 12 hours*	3 / 12 / 3 hours*
Mitch	Oct 26, 1998	905 mb (26.73 in)	155 knots	33 hours	15 hours
Camille	Aug 17, 1969	905 mb (26.73 in)	165 knots	24 hours	18 hours

\* Hurricane Allen attained Category 5 status three times during its life history: first on August 5, second on August 7, and third on August 9.

### Assault on Central America

After threatening Jamaica and the Cayman Islands, Mitch moved westward and by 2100 UTC on October 27, the Category 5 storm was about 60 miles north of Trujillo on the north coast of Honduras. Preliminary wave height estimates north of Honduras during this time at the height of the hurricane are as high as 44 feet, according to one wave model. Although its ferocious winds began to abate slowly, it took Mitch two days to drift southward to make landfall. Coastal regions and the offshore Honduran island of Guanaja were devastated. Mitch then began a slow westward drift through the mountainous interior of Honduras, finally reaching the border with Guatemala two days later on October 31.

Although the ferocity of the winds decreased during the westward drift, the storm produced enormous amounts of precipitation caused in part by the mountains of Central America. As Mitch's feeder bands swirled into its center from both the Caribbean and the Pacific Ocean to its south, the stage was set for a disaster of epic proportions. Taking into account the orographic effects by the volcanic peaks of Central America and Mitch's slow movement, rain fell at the rate of a foot or two per day in many of the mountainous regions. Total rainfall has been reported as

high as 75 inches for the entire storm. The resulting floods and mud slides virtually destroyed the entire infrastructure of Honduras and devastated parts of Nicaragua, Guatemala, Belize, and El Salvador. Whole villages and their inhabitants were swept away in the torrents of flood waters and deep mud that came rushing down the mountainsides. Hundreds of thousands of homes were destroyed.

#### Re-birth and Florida Land Fall

The remnants of Mitch drifted northwestward as a weak depression and entered the Bay of Campeche on November 2. Over the warm waters and favorable conditions aloft, Mitch once more regained tropical storm status and began moving rapidly northeastward. It struck the western side of Mexico's Yucatan Peninsula which weakened it to tropical depression status once again. As Mitch moved back over the Gulf of Mexico, it regained tropical storm status for the third time. It raced northeastward and pounded Key West with tropical storm force winds and heavy rains on November 4-5. Some of the roofs and buildings damaged by Hurricane Georges in September fell victim to Mitch. Rains of six to eight inches were common in southern Florida and several tornadoes struck the region. At least 7 were injured when a tornado swept from Marathon to Key Largo. A second tornado touched down at Miramar north of Miami. At Fowey Rocks Lighthouse, just southeast of Miami, a wind gust of 73 mph was reported. Across south Florida, some 100,000 customers lost electrical power. One person was killed in the U.S. near Dry Tortugas when a fisherman died from a capsized boat. A second person was missing. Another person died as a result of an auto accident on a slick highway. Mitch passed through the Bahamas and finally became extratropical on November 5.

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#### Damage Synopsis by Country

Table 3 - Preliminary Mitch Casualty Reports

Country	Deaths	Missing	Damage
Honduras	6500	4600 - 11,000(?)	\$4 billion
Nicaragua	3800	7,000 (?)	\$1 billion
El Salvador	239	130	?
Guatemala	256	?	?
Mexico	9	0	?
Costa Rica	7		
Jamaica	3		
Panama	3	0	?
U.S.	1		

Schooner "Fantome" 31	0	?
Total	11,000 11-18,000 ?	\$5 billion +

Following are reports of the damage and destruction left by Mitch from each country affected:

## Honduras

Entire country affected.

### *Human toll:*

An estimated 6,500 dead with up to 11,000 still missing. Up to 1.5 million people displaced and homeless. Critical food, medicine, and water shortages. Hunger and near-starvation widespread in many villages. Epidemics feared as malaria, dengue, and cholera make appearance. Fever and respiratory illnesses widespread. Helicopters required to take supplies to areas cut off by floods, but were in short supply. Some survivors still reported clinging to roof tops, and isolated areas of Honduras had not received help as late as November 12. At least 20% of country's population now homeless. Many of the unidentified dead were being buried in mass graves or their bodies were cremated. Tegucigalpa Mayor Cesar Castellanos, a likely candidate for Honduras' presidency in elections in 2001, and three others were killed when their helicopter crashed while surveying flood damage on Sunday, November 1. On Wednesday, November 4, the U.S. Coast Guard called off its search for the schooner "Fantome" after debris and life jackets were found. Thirty-one members of the crew were presumed lost after the captain tried to shield the boat from Mitch by sailing south of Guanaja Island. The last contact from the ship was on October 27.

### *Structural damage:*

Infrastructure devastated. Whole villages washed away. Estimated 70 - 80 percent of transportation infrastructure destroyed. The majority of the country's bridges and secondary roads washed away. Even airports were under water. Helicopters were required for most rescues and aid because of transportation difficulties; communications disrupted. Fuel, electricity and running water scarce commodities. Damage so severe it may take 15 years to 20 years or more to rebuild. Some buildings 350 years old in capital city of Tegucigalpa were reported to be washed away completely. One third of all buildings in the capital were damaged by the floods. In outlying areas, over 25 small villages in the northern part of the country were swept away. Survivors were still clinging to roof tops a week or more after the storm. Heavy damage along coastline and off-shore islands from storm surge and hurricane-force winds. Severe damage inflicted on tourist resorts. Damage estimates of four billion dollars in Honduras alone.

### *Crop damage:*

At least 70 percent of crops destroyed, including 80 percent of the banana crop. Crop losses estimated at \$900 million. Large warehouses and storage rooms for coffee flooded. Maize and corn crops devastated. The damage by Mitch to Honduran agricultural production will take years for recovery.

## Nicaragua

Northwest parts and northern parts of country most affected.

### *Human toll:*

An estimated 3800 dead with perhaps as many as 7,000 others still missing. Two million people directly affected and 500,000 - 800,000 homeless. Intense near-stationary rain bands over western Nicaragua on Thursday and Friday (October 29-30) caused tens of inches of rain to fall. The crater lake atop the dormant Casita volcano filled and part of the walls collapsed on Friday, October 30, causing mud flows that eventually covered an area ten miles long and five miles wide. At least four villages were totally buried in the mud that was several feet deep. Over 2,000 of the dead were from the areas around the collapsed volcano near Posoltega. In many cases, survivors had to wait days before the mud had dried enough to walk to rescuers. Damage was extensive from flooding in other parts of the country, also. As late as November 8, over a thousand people were in urgent need of supplies on the Coco River near the border with Honduras. Earlier, on Thursday, November 5, five hundred bodies were found in the same river near the town of Wiwili. An additional five hundred unidentified bodies had washed up on the Pacific shore after flood waters had washed their bodies out to sea. As with Honduras, there were critical food and water shortages in flooded areas.

### *Structural damage:*

Infrastructure in affected regions devastated. Several villages buried under mud slides near the Casita Volcano. Damage estimates for Nicaragua are at \$1 billion. Damage considered worse than in the 1972 Managua earthquake. Damage to a half million homes and 750,000 people lost their homes or possessions.

### *Crop damage:*

Thirty percent of coffee crop destroyed according to preliminary reports. Beans, sugar, and banana crops devastated.

## Other Countries:

### *El Salvador:*

Western part of country most affected by rain bands spiralling into Mitch from the Pacific Ocean. 230 dead. 500,000 forced from their homes by flooding. As much as 80% of maize crop lost. Coffee plantations and sugar cane crop severely affected.

### *Guatemala:*

Over 200 killed by floods. Ten U.S. citizens and one other person killed in plane crash supplying humanitarian aid on Sunday, November 1. Near 80,000 evacuated from their homes by flooding. Nearly 1 million directly affected by Mitch. Extensive damage to coffee and banana plantations.

### *Costa Rica:*

Seven reported killed by flooding, mostly in the northeastern part of the country. Few thousand forced from their homes.

### *Belize:*

Eleven dead or missing. Flood and crop damage extensive. Most of Belize City evacuated on October 28 as Mitch threatened to hit the city as at least a Category 4 storm. Had this occurred, it might have been similar to the Hurricane Hattie disaster of October 31, 1961 when Belize City was virtually destroyed and as a result the capital was moved inland to Belmopan. With Mitch stalling well east of Belize City, the disaster was not repeated and most of Mitch's damage was from flooding.

### *Mexico:*

Nine reported killed. Five died near Tapachula in southern Mexico near the Guatemalan border when their car was washed from the road. A U.S. citizen was killed near Cancun in a boating accident. Though ocean swells hit the Mexican tourist meccas of Cancun and Cozumel, they were largely unaffected. Many tourists cancelled reservations, however, when it appeared Mitch was poised to strike the Yucatan.

### Foreign Aid Provided

Former Presidents George H. W. Bush and Jimmy Carter visited the region and called for restructuring and scaling back of international debt owed by Honduras and Nicaragua. As a direct result of the disaster, the International Monetary Fund began considering the formation of an emergency fund to help countries hit by natural disasters. The United States announced on Thursday, November 5, that it would supply \$70 million in aid for Central America, and on November 10, an additional \$10 million was added. Spain reported it would provide \$105 million in aid and Sweden announced it would provide \$100-\$200 million over a three year period. In addition, tons of food and grain were flown in by humanitarian organizations. Mexico provided an airlift of urgently needed supplies, and European countries donated \$8 million. Canada supplied over \$7 million in assistance. Additional help came from Japan and other countries.

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## Central American Hurricanes

Table 4 - Noteworthy Central American Hurricanes (Since 1950)

Name/ Date	Landfall	Lowest Pressure	Wind	Deaths	Damage
Mitch Oct 27-29, 1998	Offshore Trujillo, Hond.	917 mb 990 mb	180 mph 75 mph	Total: 11,000 Honduras: 6500 Nicaragua: 3800 El Salvador: 239 Guatemala: 256 Other: 54	\$5 billion+

Cesar July 27, 1996	Bluefields, Nicaragua	985 mb	85 mph	Total: 51 Costa Rica: 26	NA
Joan October 22, 1988	Bluefields, Nicaragua	932 mb Bluefields	145 mph	Total: 216 Nicaragua: 148 Coasta Rica: 28 Columbia: 25 Venezuela: 11 Panama: 4	\$2 Billion Total Nicaragua:\$1 Billion
Greta September 17, 1978 September 19, 1978	Nr Puerto Lempira, Honduras Nr Stann Creek, Belize	NA	Honduras: 80 mph / G 115 mph	Belize: 4 Honduras: 1	NA
Fifi September 18, 1974 September 19, 1974	La Ceiba, Honduras southern Belize	NA	La Ceiba: 100 mph Belize: 100 mph	Honduras: 3,000 - 8,000	NA
Carmen September 2, 1974	Chetumal, Mexico (Yucatan)	956 mb	135 mph	-	-
Edith September 9, 1971 September 10, 1971	Cape Gracias, Nicaragua Belize	Nicaragua: 943 mb	Nicaragua: 160 mph	Nicaragua: 35	NA
Francelia September 3, 1969	NA	991 mb	110 mph	Guatemala: 100	\$4.7 Million
Hattie October 31, 1961	20 m s Belize City	924 mb Belize	E 150- 160 mph	Belize: 262 Honduras: 11 San Andres Island: 1 Honduras: 1	Belize: \$60 million



Anna July 24, 1961	60 m s of Belize City	NA	E 75 mph	Honduras: 1	NA
Abby July 15, 1960	southern Belize	995 mb	80 mph	0	\$600,000
Janet September 28, 1955	Chetumal, Mexico	E 914 mb	175 mph / E 200 mph	Mexico Yucatan: 500 Belize: 16 Grenada: 122 Barbados: 38 Carriacou: 25	Mexico: \$40 Million Belize: \$5 Million

### *Satellite Images of Hurricane Mitch*

- [October 27 : 13:00 UTC - Multispectral Colorized Image](#) - Category 5 (917 mb/155 knots)
- [October 26 : 1445 UTC - Full Earth View](#) - Category 5 (923 mb/135 knots)
- [October 26: 1815 UTC - Colorized IR at Lowest Pressure](#) - Category 5 (906 mb/145 knots)
- [October 26: 1815 UTC - Visible at Lowest Pressure](#) - Category 5 (906 mb/145 knots)
- [October 26: 1245 UTC - IR After Category 5 Attained](#) - Category 5 (923 mb/135 knots)
- [October 26: 1245 UTC - Visible After Category 5 Attained](#) - Category 5 (923 mb/135 knots)
- [NESDIS Operational Significant Event Imagery](#)

### *Estimated Precipitation Amounts*

Precipitation estimates for Mitch for the total storm event in Honduras and Nicaragua have ranged from 50 to 75 inches for locations receiving the heaviest rainfall. These values are not unreasonable considering the tropical location and the altitude of the mountainous terrain. For example, Hurricane Flora produced similar or even higher precipitation totals over Cuba in 1963. In one incident, Mitch reportedly produced 25 inches of rain in just six hours! With the infrastructure damaged so severely, it is unlikely that actual precipitation measurements for Mitch will be available from many areas. The National Climatic Data Center will attempt to locate satellite-derived estimates or other sources and will report the data as they are received.

Following are Hurricane Mitch preliminary rainfall reports, showing rainfall in affected countries for the 6-day period ending on Oct 31, 1998 - amounts listed for totals of at least 3.00 inches. These totals are based on data received for synoptic stations, which are then summarized into summary of day data, and finally into this table. Note that there were a great deal of missing data, which is typical for this region, but even more so due to the extreme conditions. **Many if not all of these stations certainly received higher rainfall totals.** Also, rain gauges in more remote mountainous locations (not official reporting stations) reportedly received amounts

exceeding 48 inches. Given La Ceiba's report of 24.19 inches at an elevation of only 3 meters, this is not surprising.

STATION = Station number

RAIN = Total reported rainfall (inches) for the 6-day period ending on Oct 31.

DAY = Number of days of data for the 6-day period --

Note that most stations did not report for all possible days

NAME & COUNTRY = Station name and country: HO - Honduras, ES - El Salvador, CS - Costa Rica, BH - Belize, NK - Nicaragua

LAT/LON = Latitude and Longitude in degrees and minutes

ELEV = Elevation in meters

STATION	RAIN	DAY	NAME & COUNTRY		LAT	LON	ELEV(M)
787050	24.19	6	LA CEIBA/GOLOSON	HO	1544N	08652W	0003
786500	10.33	5	ACAJUTLA/SONSONATE	ES	1334N	08950W	0015
787070	9.97	4	YORO	HO	1510N	08707W	0670
787180	9.41	6	SOTO CANO AB	HO	1423N	08737W	0626
787060	8.43	1	TELA	HO	1543N	08729W	0003
787030	8.12	3	ROATAN	HO	1619N	08632W	0005
787140	7.32	5	CATACAMAS	HO	1454N	08556W	0442
787620	6.73	5	SAN JOSE/SANTAMARIA	CS	1000N	08413W	0931
787080	6.06	4	LA MESA/PEDRO SULA	HO	1527N	08756W	0031
787110	5.72	5	PUERTO LEMPIRA	HO	1513N	08348W	0013
785960	4.25	4	HUNTING CAYE	BH	1606N	08815W	0001
787170	3.12	6	SANTA ROSA DE COPAN	HO	1447N	08847W	1079
787410	3.03	5	MANAGUA/AUGUSTO CES	NK	1209N	08610W	0050

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### *Additional Information and Links*

- [National Hurricane Center](#)
- [GOES Satellite Gallery at CIMSS](#)
- [Relief Web Agency](#)
- [NCDC Climatic Extremes and Weather Events](#)

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- [Climate Monitoring](#)
  - [Special Reports](#)
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